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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
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Torbjörn NILSSON et al.	)	Group Art Unit: Unassigned
	)	
Application No.: Unassigned	)	Examiner: Unassigned
	)	
Filed: November 1, 2001	)	
	)	
For: Arrangement and a Method for Inspection	)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Before examination, please amend this application as follows

IN THE SPECIFICATION

Page 1, line 7, please replace the section heading with --BACKGROUND--;

Page 1, line 15, please delete the section heading entirely;

Page 3, line 10, please replace the section heading with --SUMMARY--; and

Page 11, line 22, please replace the section heading with --DETAILED DESCRIPTION--.

Please replace the **ABSTRACT** with the following:

--An arrangement for nondestructive inspection of joint layer(s) in a multilayer structure including at least a first layer with a first outer surface, a second layer with a second outer surface and a joint layer for joining the first and second layers is

presented. The arrangement includes a heating arrangement for homogeneously heating the second outer surface of the multilayer structure, a detecting arrangement having a thermographic imaging system for registering the infrared radiation pattern representative of the temperature distribution on first outer surface of the multilayer structure, and processing facilities for establishing at least the eventual presence of a cavity or cavities in the joint layer based on the temperature distribution.--

IN THE CLAIMS

Please **CANCEL** claims 1-27 without prejudice or disclaimer.

Please **ADD** new claims 28-54 as follows:

28. (New) An arrangement for non-destructive inspection of at least one joint layer in a multilayer structure having at least a first layer with a first outer surface, a second layer with a second outer surface, and a joint layer for joining said first and second layers, the arrangement comprising:

a heating arrangement for homogeneously heating the second outer surface of the multilayer structure;

a detecting arrangement including a thermographic imaging system for registering the infrared radiation pattern representative of the temperature distribution on the first outer surface of the multilayer structure; and

a processing means for establishing at least the eventual presence of at least one cavity in the joint layer based on the temperature distribution.

29. (New) The arrangement according to claim 28, wherein the thermographic imaging system comprises infrared radiation detection equipment.

30. (New) The arrangement according to claim 28, wherein the heating means comprises one of a heating plate, a laser, and a lamp enabling a fast heating of the second outer surface of the multilayer structure.

31. (New) The arrangement according to claim 28, wherein the detecting arrangement is capable of detecting an infrared radiation pattern representative of the temperature distribution on the first outer surface substantially simultaneously with the heating of the second outer surface to register a transient process of heat transport across the multilayer structure.

32. (New) The arrangement according to claim 28, wherein the detecting arrangement is activated before a substantially homogeneous temperature distribution is reached on the first outer surface.

33. (New) The arrangement according to claim 31, wherein the processing means comprises a processing system for detecting cavities of at least a given minimum size based on the registered temperature distribution information.

34. (New) The arrangement according to claim 31, wherein the processing means comprises a processing system capable of determining the size and dimensions of cavities of at least a given minimum size.

35. (New) The arrangement according to claim 28, wherein the arrangement is used for automatic on-line operation for inspecting a number of subsequent multilayer structures, the subsequent multilayer structures being arranged to move in relation to the arrangement.

36. (New) The arrangement according to claim 28, wherein the arrangement is mobile.

37. (New) The arrangement according to claim 28, wherein the arrangement is capable of being manually operable.

38. (New) The arrangement according to claim 28, wherein the arrangement is automatically operable.

39. (New) The arrangement according claim 28, wherein the arrangement is used to inspect multilayer structures in which the thermal conductivity coefficients of the first layer and of the joint layer are lower than that of the second layer.

40. (New) The arrangement according to claim 39, wherein the coefficient of thermal conductivity of at least the first layer is lower than approximately 50 W/mK.

41. (New) The arrangement according to claim 39, wherein the joint layer comprises a polymer based material, a thermosetting layer, and an adhesive film.

42. (New) The arrangement according to claim 28, wherein the second layer comprises one of a metal, a metal alloy, a composite, and graphite, and the first layer comprises one of a ceramic, alumina, a LTCC, a polymer, and a metal alloy.

43. (New) The arrangement according to claim 28, wherein the heating arrangement heats the second layer from about room temperature to a temperature between about 100-150°C.

44. (New) A method for non-destructively inspecting joint layers in a multilayer structure including at least a first layer with a first outer surface forming one of the outer surfaces of the multilayer structure, a second layer with a second outer surface forming the opposite outer surface of the multilayer structure and a joint layer for joining the first and second layers, the method comprising the steps of:

disposing the multi-layer structure between a heating arrangement and a detecting arrangement;

heating the second layer homogeneously;

establishing a temperature distribution pattern on the first outer surface using of a thermographic imaging system; and

analyzing the temperature distribution pattern for detecting cavities or voids in the joint layer.

45. (New) The method according to claim 44, wherein the step of establishing the temperature distribution pattern comprises the steps of:

recording an infrared radiation pattern emitted from the first surface using infrared radiation detection equipment; and

converting the emitted infrared radiation pattern to the temperature distribution pattern.

46. (New) The method according to claim 45, further comprising the step of:

manually disposing the multilayer structure between the heating arrangement and the thermographic imaging system enabling inspection of the multilayer structure.

47. (New) The method according to claim 45, further comprising the steps of:

automatically arranging a plurality of subsequent multilayer structures into position for inspection; and

operating the infrared detection equipment forming the thermographic imaging system for subsequently arriving multilayer structures.

48. (New) The method according to claim 44, further comprising the steps of:

applying heat to the second layer in a manner allowing fast heating of the second layer; and

activating the detecting arrangement substantially simultaneously with the applying of heat to the second layer to allow recording of a transient process of heat transport across the first outer surface.

49. (New) The method according to claim 44, further comprising the step of:

heating the second layer from about room temperature to a temperature between about 100-150°C.

50. (New) The method according to claim 45, further comprising the step of: evaluating the temperature distribution pattern using a processing system to at least determine the size of cavities exceeding a given value.

51. (New) The method according to claim 44, further comprising the steps of:

providing reference values on temperature distribution patterns corresponding to cavities of a given size; and

comparing obtained temperature distribution patterns having temperature values with the reference values to determine the size of cavities.

52. (New) The method according to claim 44, further comprising the steps of:

defining a maximum limit for the size of acceptable cavities;

comparing the size of a detected cavity with the maximum limit; and

automatically activating an alarm if a joint layer contains at least one cavity exceeding said maximum limit.

53. (New) The method according to claim 52, wherein an activating of the alarm leads to the step of:

for on-line operation, automatically indicating a multilayer structure having a joint layer having one or more cavities with a size exceeding the maximum limit.

54. (New) The method according to claim 44, wherein the second layer comprises one of a metal, a metal alloy, a composite, and graphite, the first layer comprises one of a ceramic material, a metal alloy, and a composite, the joint layer comprises a polymer, a thermosetting material, and an adhesive film, and the

second layer has a coefficient of thermal conductivity which is relatively high as compared to a coefficient of thermal conductivity associated with the first layer and the joint layer to limit the rate of heat transport through the multilayer structure.

REMARKS

The specification has been amended and the claims and abstract have been replaced to place the application in better form for examination. Favorable consideration is respectfully solicited.

Respectfully submitted,

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I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231

J Snead

[signature]

Attachment to Preliminary Amendment dated November 1, 2001

Marked Up Copy of Amendments
to the Specification Section Headings

Page 1, the section heading at line 7
[TECHNICAL FIELD] --BACKGROUND--

Page 1, the section heading at line 15
[STATE OF THE ART]

Page 3, the section heading at line 10
SUMMARY [OF THE INVENTION]

Page 11, the section heading at line 22
DETAILED DESCRIPTION [OF THE INVENTION]

Attachment to Preliminary Amendment dated November 1, 2001

Marked Up Copy of Amendments
to the Abstract

[The present invention relates to an] An arrangement for nondestructive inspection of joint layer(s) in a multilayer structure [comprising] including at least a first layer with a first outer surface, a second layer with a second outer surface and a joint layer for joining [said] the first and second layers is presented. [It comprises] The arrangement includes a heating arrangement for homogeneously heating [up said] the second outer surface of the multilayer structure, a detecting arrangement [comprising] having a thermographic imaging system for registering the infrared radiation pattern representative of the temperature distribution on [said] first outer surface of the multilayer structure, and processing [means] facilities for [, based on the temperature distribution,] establishing at least the eventual presence of [(a)] a [cavity/cavities] cavity or cavities in the joint layer based on the temperature distribution.